Bibliometric Analysis of the International Head and Neck Scientific Group Production

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This article was written by members of the International Head and Neck Scientific Group (www.IHNSG.com).

Abstract

Objective: Multidisciplinary groups with a focus on analyzing medical literature are scarce in the head and neck oncology. We summarize the International Head and Neck Scientific Group activity.
Data sources: Web of Science database.
Review methods: A bibliometric study was done. We made a descriptive analysis of the articles; an analysis of citations and a network analysis by co-authorship and by co-occurrence.
Conclusions: 213 articles were published. The mean number of articles by year was 20.7±6.4. The mean number of authors per article was 10.3±5.8. Authors from 35 countries contributed to the publications. 150(70%) articles were reviews and 44(21%) editorials. The articles have been published in 29 journals with a mean IF value of 4.5±6.4. 663 journals have cited publications of the group.
Implications for practice: The experience of a group focused in critically appraising, reviewing and summarizing the literature has been positive with significant impact. Similar initiatives in other fields should be encouraged.

Keywords: Head and neck; Review; Bibliometrics; Publications; Interdisciplinary communication

Abbreviations: IHNSG: International Head and Neck Scientific Group; ENT: Ears, Nose and Throat; IF: Impact Factor, IRB: Institutional Review Board, ICOR: International Consortium of Orthopaedic Registries; RTOG: Radiation Therapy Oncology Group; EORTC: European Organization for Research and Treatment of Cancer

Introduction

The importance of multidisciplinary clinical groups has been clearly demonstrated in many publications reporting beneficial effects on both patient outcome and costs [1-3]. However, multidisciplinary scientific groups with a focus on analyzing medical literature are scarce in the head and neck oncology field. Most recognized groups have been coordinated to develop multicentric studies (as RTOG or EORCT) [4,5] or as consortiums to collect data and samples from patients (such as INHANCE or ICOR) [6,7]. These groups are mainly formed by authors from specialized institutions with a wide availability of human and technological resources and with specific focus on producing new knowledge. Therefore, authors and patients from low-volume institutions or developing countries are underrepresented in these types of organization.

Most scientific journals are dedicated to publishing original studies, mainly those with positive results. Original work is the source of new alternatives in the management of patients and represents the cornerstone of scientific progress. However, the task of reviewing, analyzing and summarizing the huge quantity of previously published information into a rational framework and presenting it in a way that facilitates its

understanding and application by the average clinician is increasingly challenging given the rapid expansion of the medical literature. As reported by Chalmers, citing Rayleigh, "Two processes are thus at work side by side, the reception of new material and the digestion and assimilation of the old; and as both are essential we may spare ourselves the discussion of their relative importance" [8]. Due to the enormous quantity of information that is produced daily, narrative and systematic reviews are compilations of knowledge that fill a vacuum and serve to inform the results of primary studies, with a critical vision and with the intention of adapting it to common clinical conditions [9].

As many therapies and diagnostic approaches presented in original studies are expensive or complex, they are often reported in social or economic settings which do not pertain to the average reader or deal with selected patient groups which may be difficult to replicate in community practice. Therefore, authors from non-research institutions and developing countries where these therapies are applied may find such novel techniques challenging to introduce [10]. However, by engaging clinicians from such backgrounds who are involved in patient care but also have training in research and a desire to help review and disseminate information by engagement in multidisciplinary scientific groups, it is hoped that such challenges can be overcome.

The International Head and Neck Scientific Group (IHNSG) were formally organized in 2009. It grew out of years of previous collaboration of international senior authors who published multiauthored review articles on various aspects of head and neck oncology, with the purpose of presenting the ever-changing "state of the art"

in diagnosis and treatment of head and neck neoplasms as practiced around the world. The objectives of multidisciplinary and global representation have been reflected by the IHNSG since its conception and represent an example of scientific work with emphasis on a critical appraisal of literature [11]. The objective of this manuscript is to summarize the IHNSG activity since its formal inception in 2009, with a focus on the impact made in the medical literature in order to inform potential participants in such groups dedicated to other topics in the field of otolaryngology or any other medical specialty of their clinical utility.

Methods

This a bibliometric study. Pubmed and the institutional webpage of the IHNSG (*www.ihnsg.com*) database were used to search and identify all articles published under the aegis of IHNSG, in the time period from January 2009 to June 2018. All identified articles were downloaded to the Excel (Microsoft Corp) and Endnote (X7, Thompson Reuters) software in order to manage and analyze them. The Web of Science platform (www.webofknowledge.com) and its analysis tool was also used. Finally, a text file from this database was exported to the VOSviewer software (http://www.vosviewer.com/) (Centre for Science and Technology Studies, Leiden University, Leiden, The Netherlands). VOSviewer presents information as network maps and each cluster represents group of closely collaborating authors or related keywords. It was used in order to expand the analysis to advanced bibliometric network measurements. For journals, we used the Journal Citation Reports (Clarivate Analytics) database and the Scopus platform (Elsevier).

The project included a descriptive analysis of the articles (author names and number, affiliation, main subject, journal, year of publication, country, number of pages and type of article (review, primary study, editorial, etc.). An exploratory analysis was made about the impact of the journals where the articles were published using the available Impact Factor (IF) for 2017, the h-index and quartile classification. The h-index is an alternative metric to impact factor that measures not only the number of publications, but also the number of citations of each publication. It grows as citations accumulate and thus it depends on the academic history of a researcher [12]. An analysis of citations of articles was also made using the analyze tool of Web of Science. Finally, a network analysis by co-authorship to explore the clusters of authors interested in a defined subject and by co-occurrence of keywords to explore the most common subjects explored for the IHNSG was made with the VOSviewer software.

Results

Due to the design of this study, an IRB approval was not necessary.

Number of articles

From January 2009 to June 2018, 213 articles published by the group were identified, all of them in the English language. (Supplementary Table 1). Year distribution is shown in Figure 1. The mean number of articles by year was 20.7±6.4 (range 9-28). The year with the highest number of articles was 2013, with 28 articles.

Figure 1: Number of articles published by year.
● Data from 2018 only covers 6 months
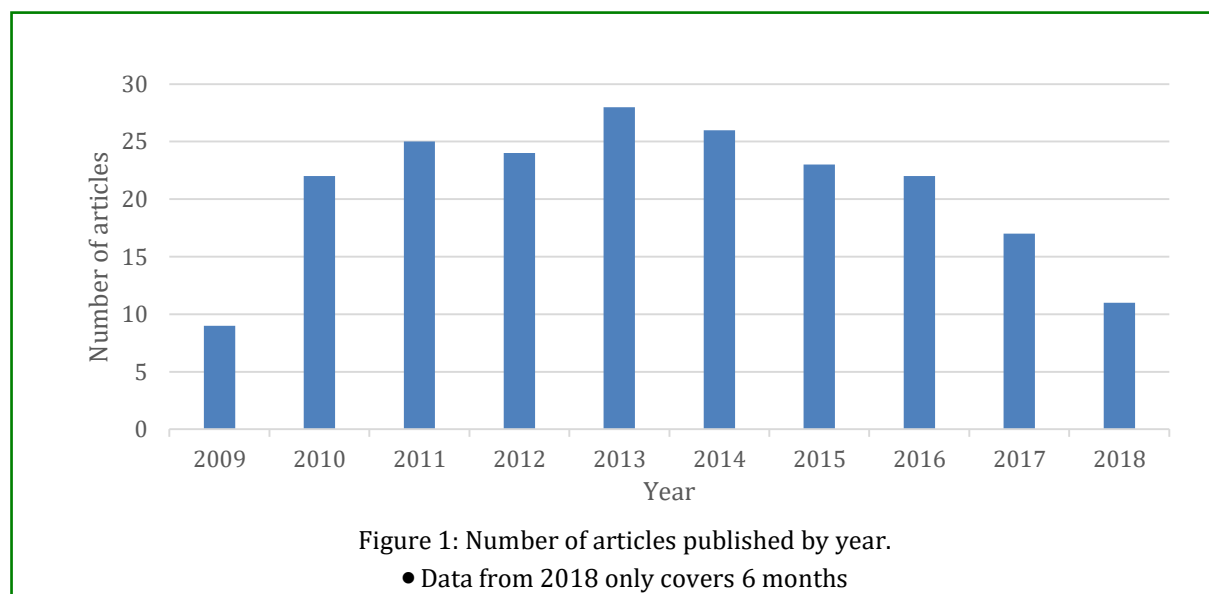
Author's characteristics

The total number of authors was 281. The mean number of authors per article was 10.3±5.8 (range 39). The article with highest number of authors was a consensus document about neck dissection classification [13]. One hundred and fifty-two (54%) of the authors had only one article participation. The ratio of authors per article/year is shown in Supplementary Figure 1, with an increasing trend over time. The year with highest ratio was 2016 with 16.1 authors per article. Authors from a total of 35 countries contributed to the publications. The authors' country distribution is shown in Supplementary Figure 2. The countries with the most contributors were Italy and USA.

The authors reported 2783 affiliations. 68% of affiliations were from universities and 33% from hospitals/medical centers. The top ten affiliations are shown in Table 1.

Institutions	Records
University of Udine, Italy	207
Radboud University Nijmegen, Netherlands	123
Albert Einstein College of Medicine, USA	111
Central University Hospital Asturias/ Instituto de Oncologia De Asturias, Oviedo, Spain	94
Institute of Oncology Slovenia, Slovenia	81
University of Texas System/Md Anderson Cancer Center, USA	77
University of Oklahoma System, USA	69
Southern Illinois University System, USA	68
University of Arkansas System, USA	66
University of Michigan System, USA	66

Table 1: Top ten list of author affiliations.

Article characteristics

The research subject distribution according to Web of Science database is shown in Supplementary Figure 3. The most frequent area of was otorhinolaryngology - head and neck surgery (ENT). The distribution of article type was: 150 (70%) review articles, 44 (21%) editorials, 14 (7%) primary studies and 5 (2%) letters to the editor.The articles contained 1604 published pages. Mean number of pages by article was 7.5±4.7 (1-28). The largest article was dedicated to toxicities of new drugs [14]. The articles had a total of 13488 references. The mean number of references per article was 64±44 (2-202). The article with the highest number of references dealt with treatment of radiotherapy sequelae [15].

Journals

The articles of the group have been published in 29 journals. The distribution by journal and its corresponding IF and quartile distribution is shown in Table 2. The journals that published most of our contributions were European Archives of Otorhinolaryngology (EAORL) (40%), Head & Neck (28%) and Oral Oncology (8%). The five journals with the higher IF were Lancet Oncology (36.4), Cancer Treatment Reviews (8.1), Thyroid (7.5), European Journal of Cancer (7.1) and American Journal of Surgical Pathology (5.8). The mean IF value and the mean h-index of journals that published articles were 4.5±6.4 (median 3.1) and 103.4±55.1 (median 97), respectively. 22/29 (75%) of articles were published in journals classified Q1 in the Scimago Journal Ranking (https://www.scimagojr.com/).

Source Titles	Records	Impact factor	H- index	quartile
European Archives of Oto Rhino Laryngology	86(40%)	1,546	58	Q2
Head and Neck	59 (28%)	2,471	109	Q1
Oral Oncology	18 (8%)	4,636	96	Q1
Advances in Therapy	9 (4%)	3,085	51	Q1
Auris Nasus Larynx	5 (2%)	1,387	38	Q2
European Journal of Surgical Oncology	4 (2%)	3,688	86	Q1
Laryngoscope	4 (2%)	2,442	128	Q1
American Journal of Otolaryngology	3 (1%)	1,046	49	Q2
American Journal of Surgical Pathology	2 (1%)	5,878	185	Q1
Cancer Treatment Reviews	2 (1%)	8,122	107	Q1

Table 2: Top ten of journals of IHNSG publications.

Citation analysis

There were 3357 external citations of published articles. The mean number of citations per article was 15.6±19.5 (median 9, 0-127) and the mean number of citations by year was 327 ±225 (median 301, 8-666). Only 17 (7.9%) articles have not been cited, twelve of them published in the most recent 12 months. 663 journals have cited publications of the group, the five most common were Head &Neck, EAORL, Oral Oncology, Laryngoscope and Otolaryngology-Head & Neck Surgery. The most common subjects of citations were related to ENT (33.9%), oncology (38.4%), surgery (23.4%), dentistry (10.6%) and radiology (6.6%). The authors who cited the articles work mainly in USA (30.1%), China (12%), Italy (11.3%), Germany (9.3%) and Netherlands (7.6%). Most citations were from original Articles (77.5%) then reviews (17.9%). Finally, Figure 2 shows the number of citations has increased progressively through the years. The most cited article was about trend of surgery in laryngeal cancer and received 127 citations [16]. The top ten cited articles are shown in Table 3. The overall H-index of articles published was 32.

Figure 2: Number of citations by year.
• Data from 2018 only covers 6 months.
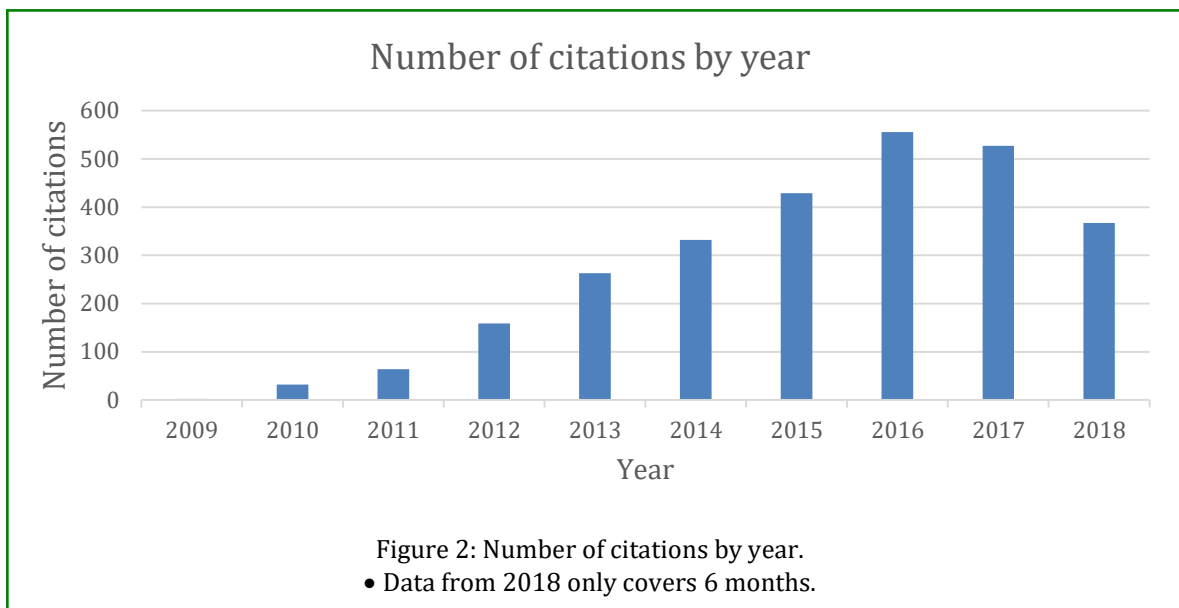
Article	Year	Number of citations
Current trends in initial management of laryngeal cancer: the declining use of open surgery [16]	2009	127
Surgical margins in head and neck cancer: A contemporary review [17]	2013	87
Comorbidity in head and neck cancer: A critical appraisal and recommendations for practice [18]	2010	84
Current trends in initial management of hypopharyngeal cancer: The declining use of open surgery [19]	2012	73
Advances and applications of oral cancer basic research [20]	2011	70
Human papillomavirus infections in laryngeal cancer [21]	2011	68
Current treatment options for recurrent nasopharyngeal cancer [22]	2010	66
Evidence-based review of treatment options for patients with glottic cancer [23]	2011	63
Neuroendocrine neoplasms of the larynx: an overview [24]	2009	62
Adenoid cystic carcinoma of the head and neck - An update [25]	2015	61

Table 3: Top ten cited articles.

Network analysis

The co-authorship network analysis identified 12 clusters (by colors) from 78 authors (3 for the smaller and 18 for the larger). Each node represents an author and the links between two nodes specifies co-authorship between the two authors. As can be seen in the graph, there are global leaders (e.g. Ferlito A, Rinaldo A, Takes RP, Silver CE, Strojan P, Rodrigo JP) who have co-authorship with many authors and also community leaders (e.g. Devaney KO, Haigentz M Jr., Mendenhall WM, Kowalski LP) who have co-authorship with a specific group of authors. There are also isolated authors (e.g. Stenman G, Wenig BM, Forastiere AA) who do not have relationship with other coauthors (Figure 3).
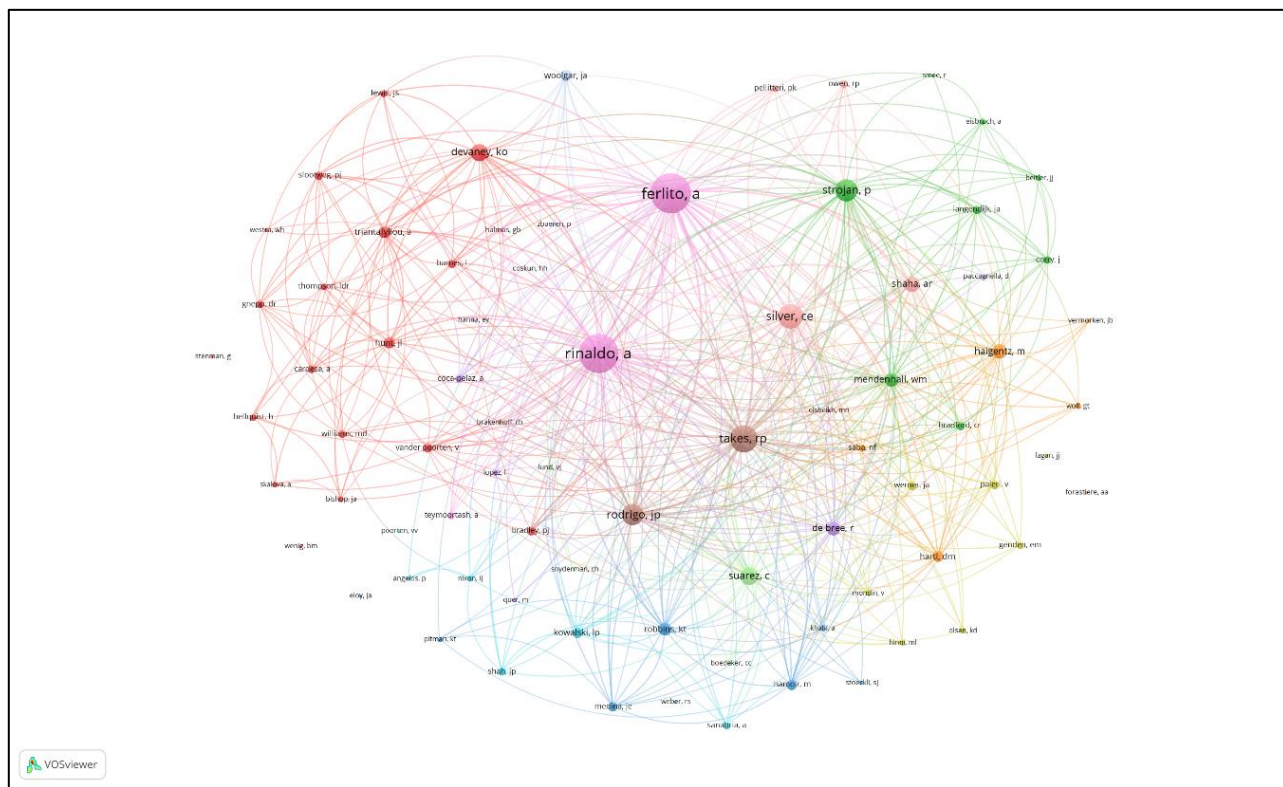

Figure 3: Co-authorship network of articles published by the IHNSG.

The co-occurrence networks for keywords are generally used to provide a graphic visualization of potential relationships between terms provided in the articles and shows the trend of subjects studied. The size of each node represents its relative weight and the distance between two nodes reflects the strength of the relation between them. The link strength between two nodes refers to the frequency of co-occurrence. It can be used as an index of the relationship between two nodes. After setting the minimum threshold to 10, 7 clusters from 191 items were identified. The three most important cluster were related to 1), terms about alternatives of treatment of advanced head and neck tumors, 2) terms about diagnostic and therapeutic approach for neck dissection and 3) terms related to surgery of thyroid and salivary gland tumors. The most frequently cited keyword was squamous cell carcinoma (74), followed by head (40), radiotherapy (32) and management (30). The term squamous cell carcinoma had the higher link strength (55) and had 226 links. As can be seen in the graph, main keywords are generic as squamous cell carcinoma, head and neck cancer, radiotherapy or cancer and represent the highest quantity of subjects assessed. However, there are other specific terms, with a lower representation such as parathyroid surgery, mucoepidermoid carcinoma, and induction chemotherapy and fine-needle aspiration. Some subjects were more frequently approached in recently years such as adenoid cystic carcinoma, thyroid cancer and survival. Finally, there are keywords that were isolated including targeted therapy, neuroendocrine carcinoma and skull base (Figure 4).

Figure 4: Co-occurrence network of keywords from articles published by the IHNSG.

Discussion

The publication of scientific results following peer review is the most widely accepted method for dissemination of new findings in order for them to be criticized and rejected or accepted in to standard practice. In medical practice this method relies on the involvement of external peers who act as referees to attempt to guarantee the standard of published work which is considered for application to patient care [26,27]. Bibliometrics is the science of quantitative analysis of bibliographic material by statistical methods and is used to measure the impact of research articles [28]. Although uncommon in medical literature, recently bibliometric analysis has grown as a tool to examine scientific production and to explore relationships between authors, countries and institutions. It has therefore been recognized as an objective measurement of the impact of published articles. In medical practice this method relies on the involvement of external peers who act as referees to attempt to guarantee standard of published work which is considered for application to patient care [26,27].

The medical literature analysis has undergone a recent explosion for a number of reasons. First, the appearance of Evidence Based Medicine and the technification of critical appraisal has made the systematic analysis of articles a necessary tool for all physicians [29]. Second, the acceptance of systematic reviews as a high-quality source of information for decision making relaunched the function of summarizing original studies in a more coherent framework useful for the practicing surgeon.[21] Third, the recent proliferation of predatory journals that publish almost any piece of literature independent of its methodological quality, challenges the established role of published articles as a reliable source of information [30]. For all of these reasons, the importance of critical literature review as part of the overall process of literature appraisal is increasingly recognized. This role can only be accomplished on a global scale by interdisciplinary groups of physicians representing a spectrum of scientific and socioeconomic settings. To date, most existing interdisciplinary groups have focused in conducting trials that result in the publication of original articles [4,31]. However, the number of structured groups who coordinate to appraise literature

and summarize findings in a rational structure is low. The International Head and Neck Scientific Group is an example of this type of group. Since its conception, it has been designed to link recognized senior clinicians in head and neck related specialties who share an interest in and knowledge of recent advances in their own fields. However, all members also share an interest in placing original published work in the common clinical context as well as disseminating their knowledge and experience in a useful and articulated way which is easy to understand and incorporate into practice by practicing clinicians.

The method used to produce a review is based on the main author interest. He or she proposes a subject, which is widely communicated to coauthors with similar interest by the coordinator of the group. After few cycles of communication, a specific group is assembled to develop the project. This group works in concert with the first author. The proposal is clearly detailed, often with different sections assigned to and always with open participation of coauthors. After rounds of criticisms, corrections and suggestions which are incorporated to the manuscript, the completed paper is finally submitted for publication in an agreed journal.

This analysis of scientific production of a dedicated group shows that the effort appears to be rewarding. The number of manuscripts produced is high (213) and although it continues to rise, the rate of growth has plateaued. Despite evidence suggesting that an increased number of authors does not result in a higher future rate of citation, [32,33] we also report that the IHNSG has experienced a progressive increase in the number of authors per article, which may also explain why the number of articles is decreasing in favor of involving more authors per article. A high number of authors from different countries and level of development allows more discussion for controversial topics and introduces different opinions and experiences on the same subject.

The authors are recognized authorities in their fields, most of them coming from strong academic communities (68%) but with active clinical practice (33%). In fact, most of these authors act as mentors of younger authors, as demonstrated by the 54% of authors with only one participation. The distribution of co-authorship shows two types of authors: global leaders and community leaders. The latter work on specific clusters of authors and with specific subjects, but the relationship between clusters is low. In addition, there are a significant number of isolated authors, representing super specialized interests with a narrow scientific focus. Most authors are from developed countries, but the high number of

participating countries evidences the international scope of the group.

Most published articles have been reviews and editorials, but there has been a growing trend of publishing original research. There is evidence that original articles and reviews receive more citations than other types of articles [34,35]. The length of the articles was moderate. Some studies have demonstrated that length of the article is related to frequency of citation, showing articles larger than 20 pages cited less often [32,33]. The number of references by article was high, around 64. There is also empirical evidence, that a higher number of references are associated with higher numbers of citations. However there is not an established threshold above which they are considering excessive [36]. Falagas et al. [32] determined that the mean number of references in biomedical journals is 29. Regarding the impact of articles, all were published in recognized journals guaranteeing that they were carefully assessed by external referees and submitted to a strict peer review process. Most journals had high impact factors, high H-index and belong to the higher-ranking quartiles in their categories.

The number of citations of articles is another indicator of quality. Although there is no data about the world impact factor of head and neck literature, other areas such as pain and malaria resistance have an impact factor of 3.1 and 63, respectively [37,38]. Each article has been cited a mean of 15 times and the number of citations has grown progressively. This means that articles have been well received by other authors and are considered of high enough quality to be cited. Although the number of manuscripts published per year has recently remained stable, the importance of each is growing as judged by citations. Journals citing the group's work belong to a wide group of specialties, including dentistry and radiology, in addition to otolaryngology, surgery and oncology. In addition, authors who cited the group's articles come from many countries. These findings demonstrate the influence of the IHNSG in different spheres of both geography and knowledge. Articles are cited predominantly in original studies, which support the suggestion that a good synthesis of current information serves to support new scientific developments in the field.

Regarding the impact the articles have had, all were published in English language journals, indexed in the main recognized databases (Medline and Embase), and belong to different scientific categories including ENT, surgical oncology, pathology, maxillofacial surgery and radiotherapy, which assures a wide dissemination within the general field of head and neck oncology. Finally, the co-occurrence network demonstrated a strong and

enduring interest in specific subjects related to advanced head and neck cancer and neck dissection in particular. However, this network also offered information about some "orphan" subjects, that were tangentially approached and deserve more exposure including parathyroid, salivary gland and skin and soft tissue tumors, imaging, pathology, prognosis, epidemiology, outcomes and basic research.

This study has limitations. The first is related to the criteria of citation as a reliable method for evaluation of the quality of articles. Some authors have criticized this measurement and some even favors its abolition [39]. To date, only the h-index has surpassed the weaknesses of impact factor, and therefore we used this metric in order to improve the analysis [40]. The second is related to the bibliometric methods and the sources of information. Although recent advances have been applied to the field, it remains dependent on many subjective assumptions. As we aimed to describe an experience, we believe that the data presented represents the impact of the articles published by the group [28]. Third, although co-authorship was used as a surrogate measure of collaboration the individual contribution made by each co-author could not be identified on a per-manuscript basis.

Conclusion

The experience of a dedicated group of physicians with interests in the field of head and neck who have a focused collaborative objective of critically appraising, reviewing and summarizing the literature has been positive. The scientific production of the IHNSG has resulted in significant impact and its results help in dissemination of information to authors around the world. Similar initiatives in other fields should be encouraged.

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